

I CLAIM:

1. A shaft assembly comprising:

a rotatable, torque transmitting elongated member defining a portion thereof which is hollow having an inside surface defining a shaft core, said shaft having an outside surface including a torque transmitting portion and a functional feature portion, said elongated member defining an aperture gate extending from the inside surface to the outside surface; and

a hardened, moldable material, said material extending from the inside surface through the aperture gate, the material secured to at least a portion of the outside surface.

2. The shaft assembly of **claim 1**, wherein said elongated member has a one piece construction;

3. The shaft assembly of **claim 1**, wherein said elongated member comprises a plastic.

4. The shaft assembly of **claim 1**, wherein said elongated member is made by a gas injection molding process.

5. The shaft assembly of **claim 1**, wherein said elongated member comprises at least one of SPS, polycarbonate, Acetal and ABS.

6. The shaft assembly of **claim 1**, further comprising a coating applied to at least a portion of an outer surface of the hardened, moldable material.

7. The shaft assembly of **claim 1**, wherein said elongated member has a length thereof at least ten times greater an outer diameter of said elongated member.

5 8. The shaft assembly of **claim 1**, wherein a distance from the inside surface to the outside surface at the torque transmitting portion is substantially similar to a distance from the inside surface to the outside surface at the functional feature portion.

9. The shaft assembly of **claim 1**, wherein said hardened, 10 moldable material comprises a material selected to provide a frictional driving surface.

10. The shaft assembly of **claim 1**, wherein the coefficient of thermal expansion of the hollow portion and the shrink rate of the moldable 15 material are selected to provide intimate contact between the hardened moldable material and the hollow portion.

11. An apparatus comprising mechanical components capable of performing at least one operation requiring the use of a shaft assembly, said shaft assembly comprising:

a rotatable, torque transmitting elongated member defining a portion thereof which is hollow having an inside surface defining a shaft core, said shaft having an outside surface including a torque transmitting portion and a functional feature portion, said elongated member defining an aperture
5 gate extending from the inside surface to the outside surface; and

a hardened, moldable material, said material extending from the inside surface through the aperture gate, the material secured to at least a portion of the outside surface.

12. The apparatus of **claim 11**, wherein said elongated member has a one piece construction;

13. The apparatus of **claim 11**, wherein said elongated member comprises a plastic.

14. The apparatus of **claim 11**, wherein said elongated member is made by a gas injection molding process.

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15. The apparatus of **claim 11**, wherein said elongated member comprises at least one of SPS, polycarbonate, Acetal and ABS.

16. The apparatus of **claim 11**, further comprising a coating applied to at least a portion of an outer surface of the hardened, moldable material.

17. The apparatus of **claim 11**, wherein said elongated member has a length thereof at least ten times greater an outer diameter of said elongated member.

18. The apparatus of **claim 11**, wherein a distance from the
5 inside surface to the outside surface at the torque transmitting portion is substantially similar to a distance from the inside surface to the outside surface at the functional feature portion.

19. The apparatus of **claim 11**, wherein said hardened,
10 moldable material comprises a material selected to provide a frictional driving surface.

20. The apparatus of **claim 11**, wherein the coefficient of
thermal expansion of the hollow portion and the shrink rate of the moldable
15 material are selected to provide intimate contact between the hardened moldable material and the hollow portion.

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A1 ➤

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A2 ➤

21. A process for making a rotatable shaft assembly for transmitting torsional torque having at least one functional feature on an outside surface of said shaft, the process comprising the steps of:

gas injection molding an elongated member having at least a portion which is hollow having an inside surface defining a shaft core and an outside surface defining a shaft functional surface;

providing the elongated member with an aperture gate extending from the inside surface to the outside surface;

placing the hollow portion in a mold which has a cavity for the at least one functional feature on the outside surface of said portion;

filling the mold with a hardenable, moldable material, flowing the moldable material through the shaft core and cavity;

permitting the moldable material to harden to form the functional feature; and

removing the shaft assembly with the functional feature from the mold.